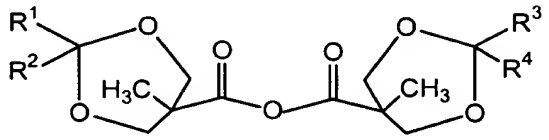
WHAT IS CLAIMED IS:

1. An anhydride having the structure:



wherein,

R^1, R^2, R^3, and R^4 are members independently selected from substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl.

2. The anhydride according to claim **1**, wherein each of R^1, R^2, R^3, and R^4 is an independently selected C_1-C_6 unsubstituted alkyl group.

3. The anhydride according to claim **2**, wherein said unsubstituted alkyl group is a member selected from the group methyl, ethyl and propyl.

4. The anhydride according to claim **1**, wherein said anhydride is a solid, which is substantially free of coupling reagent derived side products.

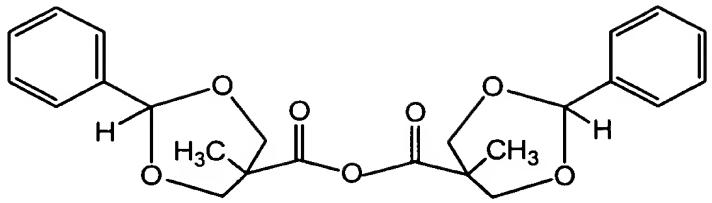
5. The compound according to claim **1**, prepared by a method consisting essentially of:

(a) combining benzylidene-2,2-bis(methoxy)propanoic acid, N,N′-dicyclohexylcarbodiimide and an organic solvent, thereby forming a reaction mixture in which said anhydride is formed;

(b) filtering said reaction mixture, thereby removing precipitated dicyclohexylurea from said reaction mixture;

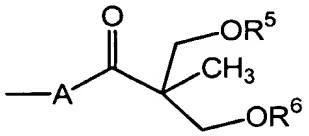
(c) precipitating said anhydride from said reaction mixture by contacting said reaction mixture with a hydrocarbon solvent, thereby producing said anhydride.

6. An anhydride having the structure:



7. The anhydride according to claim **6**, wherein said anhydride is a solid and is substantially free of coupling reagent derived side products.

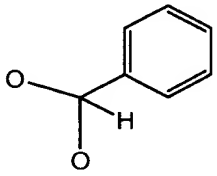
8. A dendrimer which is substantially free of urea side products, said dendrimer comprising a subunit having the structure:



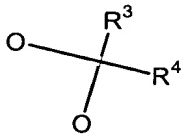
wherein,

A is an active group, which is a member selected from NH, S and O;

R^5 and R^6 are members independently selected from the group consisting of H, diagnostic agents, therapeutic agents, analytical agents, moieties comprising a reactive group or, alternatively R^5 and R^6 together with the oxygen atoms to which they are attached form a structure which is a member selected from the group consisting of:



; and



9. The dendrimer according to claim **8**, wherein A is a component of a polymer.

10. The dendrimer according to claim **9**, wherein said polymer is a member selected from the group consisting of nucleic acids, linear poly(alkylene oxides), star poly(alkylene oxides), polysaccharides, poly(amino acids) and poly(hydroxystyrene).

11. The dendrimer according to claim **8**, wherein said polysaccharide is a member selected from cyclodextrin, starch, hydroxyethyl starch and dextran.

12. The dendrimer according to claim **8**, wherein said poly(amino acid) comprises lysine, tyrosine, serine, cysteine, arginine, histidine and combinations thereof.

13. The dendrimer according to claim **7**, wherein said polymer is a synthetic organic polymer with pendant NH groups, OH groups, SH groups and combinations thereof.

14. The dendrimer according to claim **11**, wherein said synthetic organic polymer is a member selected from poly(vinylphenol), poly(hydroxymethacrylate), poly(N-2-hydroxypropylmethacrylamide), poly(diallylamine), poly(lactic acid) and poly(hydroxymethylcaprolactone), poly(4-hydroxyethylcaprolactone).

15. The dendrimer according to claim **6**, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, and antiparasitics.

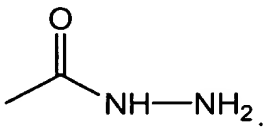
16. The dendrimer according to claim **6**, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, fluorescent agents, chromophoric agents and radioisotopes.

17. The dendrimer according to claim **8**, wherein said subunit repeats from 2 to 100 times.

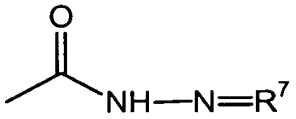
18. The dendrimer according to claim **17**, wherein said subunit repeats from 4 to 50 times.

19. The dendrimer according to claim **18**, wherein said subunit repeats from 8 to 24 times.

20. A dendrimer according to claim **6**, wherein at least one of R^5 and R^6 has the structure:



21. A dendrimer according to claim **6**, wherein at least one of R^5 and R^6 has the structure:

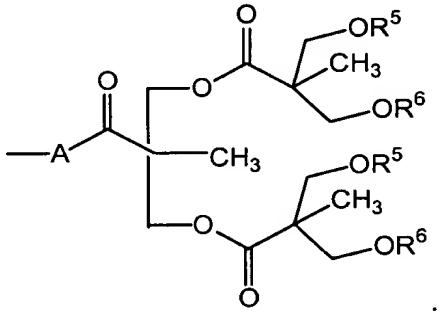


wherein, R^7 is a member selected from the group consisting of diagnostic agents, therapeutic agents and analytical agents.

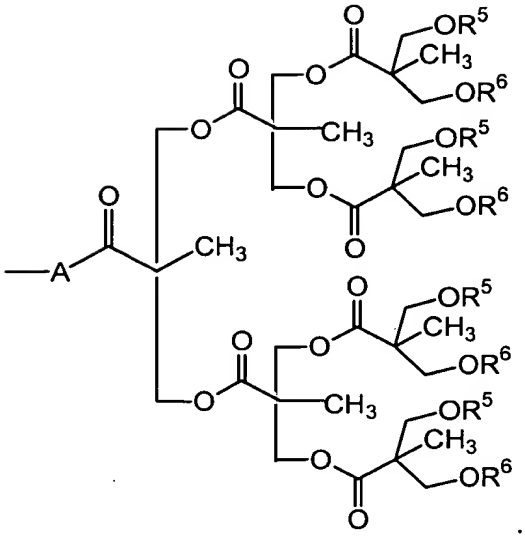
22. A dendrimer according to claim **19**, wherein R^7 is a doxorubicin derivative.

23. A pharmaceutical formulation comprising a dendrimer according to claim **6** and a pharmaceutically acceptable carrier.

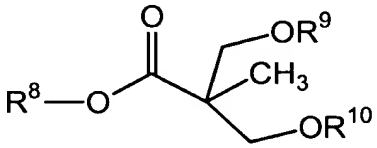
24. A dendrimer comprising a subunit having the structure:



25. A dendrimer comprising a subunit having the structure:



26. A dendrimer having the structure:



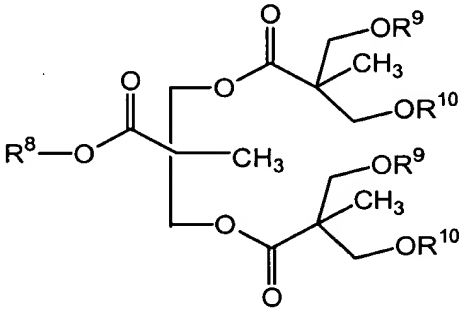
wherein,

R^8 is a nucleic acid; and

R^9 and R^{10} are members independently selected from H and a poly(ethylene oxide) residue.

27. The dendrimer according to claim **24**, said dendrimer being substantially free of urea side products.

28. A dendrimer comprising the structure:



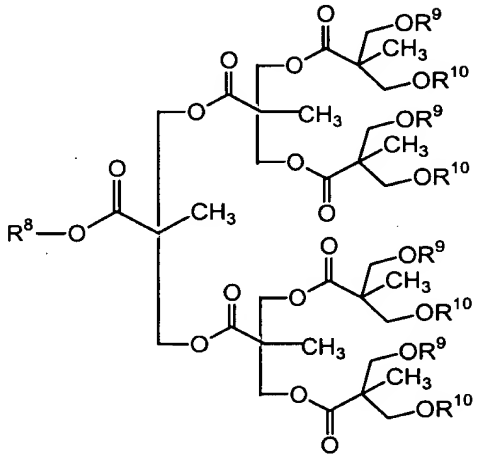
wherein,

R^8 is a nucleic acid; and

R^9 and R^{10} are members independently selected from H and a poly(ethylene oxide) residue.

29. The dendrimer according to claim **26**, said dendrimer being substantially free of urea side products.

30. A dendrimer comprising the structure:



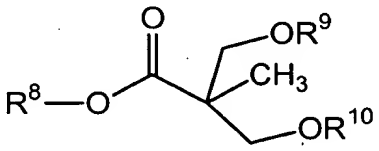
wherein,

R^8 is a nucleic acid; and

R^9 and R^{10} are members independently selected from H and a poly(ethylene oxide) residue.

31. The dendrimer according to claim **28**, said dendrimer being substantially free of urea side products.

32. A biological compartment comprising a membrane defining an interior space, said interior space comprising a dendrimer comprising a subunit having the structure:

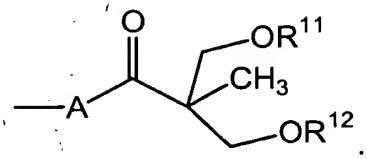


wherein,

R^8 is a nucleic acid; and

R^9 and R^{10} are members independently selected from H and a poly(ethylene oxide) residue.

33. A biological compartment comprising a membrane defining an interior space, said interior space comprising a dendrimer comprising a subunit having the structure:



wherein,

A is a residue of an active group; and

R^{11} and R^{12} are members independently selected from the group consisting of H, therapeutic agents and diagnostic agents.

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34. The biological compartment according to claim **31**, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, nucleic acids, and antiparasitics.

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35. The biological compartment according to claim **31**, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, nucleic acids, fluorescent probes, chromophoric probes and radioisotopes.

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36. The biological according to claim **31**, wherein A is a residue of a core moiety, and said core moiety is a poly(alkylene oxide) residue.

37. The biological compartment according to claim **36**, wherein said core moiety is a poly(ethylene oxide) residue.

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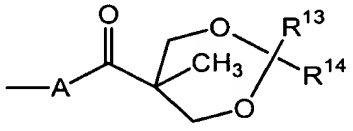
38. The biological compartment according to claim **31**, wherein said biological compartment is a member selected from cells and organelles.

39. A method of producing a protected first generation dendrimer substantially free of urea side products, said dendrimer comprising a subunit having the structure:



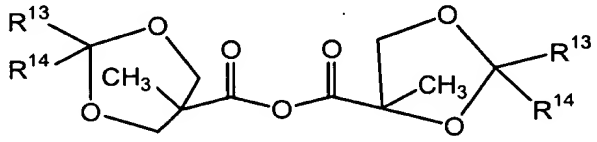
wherein,

A is an active group residue selected from NH, O and S on a core moiety; and

R^{13} and R^{14} are components of a diol protecting group and are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the proviso that when R^{13} is H, R^{14} is other than H;

said method comprising:

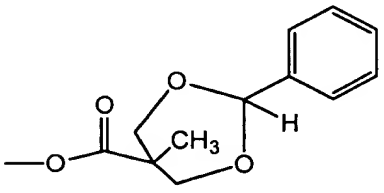
(a) forming a reaction mixture by contacting a core moiety comprising A with an acylating group in an organic solvent, said acylating group having the structure:



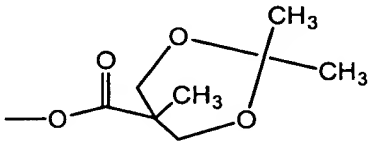
thereby acylating A, forming said dendrimer; and

(b) extracting said reaction mixture with an aqueous solution, thereby removing impurities.

40. The method according to claim **37**, wherein said subunit is a member selected from the group consisting of:

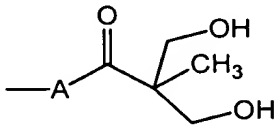


; and



41. The method according to claim **39**, further comprising:

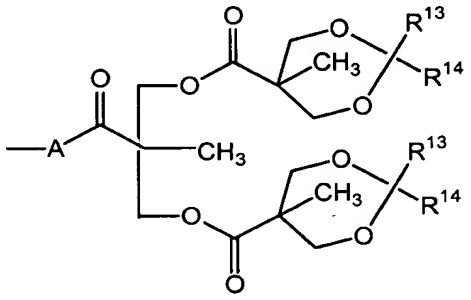
(c) removing said diol protecting group, thereby forming a first generation dendrimer comprising a subunit having the structure:



42. A dendrimer prepared by the method according to claim **39**.

43. The dendrimer according to claim **40**, wherein said dendrimer is a solid.

44. A method of producing a protected second generation dendrimer substantially free of urea side products, said dendrimer comprising a subunit having the structure:



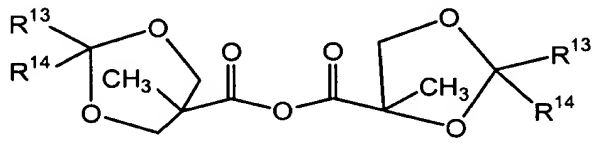
wherein,

A is an active group selected from NH, O and S on a core moiety; and

R^{13} and R^{14} are components of a diol protecting group and are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the proviso that when R^{13} is H, R^{14} is other than H;

said method comprising:

(a) contacting said first generation dendrimer according to claim **39** with an acylating group having the structure:

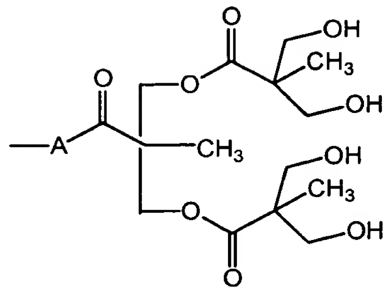


thereby acylating A, forming said dendrimer; and

(b) extracting said reaction mixture with an aqueous solution, thereby removing impurities.

45. The method according to claim **44**, further comprising:

(c) removing said diol protecting group, thereby forming a second generation dendrimer comprising a subunit having the structure:



46. A dendrimer prepared by the method according to claim **44**.

47. A dendrimer prepared by the method according to claim **44**, wherein said dendrimer is a solid.

48. A method of enhancing water solubility of an agent, said method comprising forming a conjugate between said agent and a dendrimer comprising a subunit having the structure: